ESPAR CAN HELP

Product Options to Positively Impact Our Environment

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A WORLD OF COMFORT

Espar Heater Systems

TRUCKS -- Warm Engine Starts

Espar Heater Systems

Benefits-

- Less requirement for “jump starts”
- Less driver concern that truck engine will start
- Less wear on cold engine warming up
- Less public image issues from noise and smoke
- Less pollution from starting a cold engine

MORE PRODUCTIVITY

SAVE $6,000 per truck per year

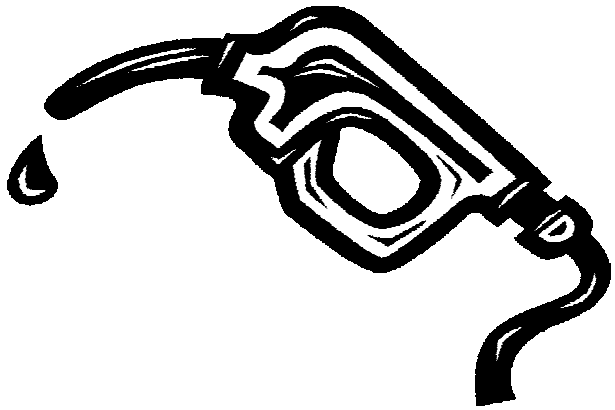
Espar Heater Systems

The quick and simple formula

Assumptions-

- Idle fuel consumption-ONE gal/hr (.85-1.25)
- 150 days per year to idle engine for HEAT* (*per US EPA)
- 10 hours per day=1,500 hrs/yr
- Fuel US average $4 gal

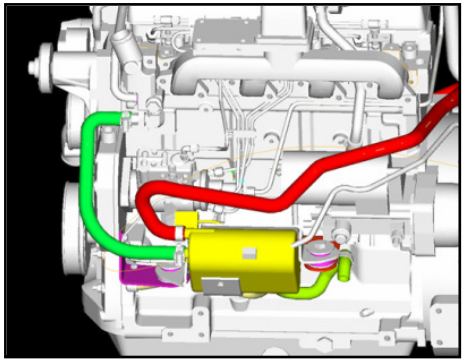
1,500 idle hours x $4 = **$6,000**



Espar *HYDRONIC* Engine Pre-heater for Heavy-Duty Trucks

- Internal circulating pump provides engine preheat throughout the engines cooling system
- No plug-ins required which provides for convenience and flexibility.
- Fast preheat in advance, which requires only 1-2 hours to assure complete engine warm up for instant vehicle usage & productivity.
- Immediate window defrosting and interior cab warmth.
- Minimal power consumption which saves on batteries.
- Compact and light weight, these systems are easy to install and won't affect payload.
- Excellent pre-heating capability for combinations of on-board oils or fluids.

Idling damages the engine from carbon deposits on valves and pistons, degradation of engine oil, and accumulation of water and sulfur in the engine



Espar Heaters Prevent Problems from COLD STARTS

- **A Cold Start** means starting the diesel engine at less than operating temperature (typically < 200 degrees Fahrenheit) –
- Diesel engines are **FIVE times as hard to start** at 0 F versus 80 F.
- **90% of engine wear** is due to low water jacket temperature.

When a cold diesel engine is started (cold start), the heat of compression is the only energy source available to heat the fuel in the combustion chamber to a temperature that will initiate spontaneous combustion (about 750° F [400° C]). Since the walls of the combustion chamber are initially at ambient temperature rather than operating temperature, they are a significant heat sink rather than a heat source. And since cranking speed is slower than operating speed, compression is also slower, which allows more time for the compressed air to lose heat to the chamber walls.

Even after the engine has started, the temperatures in the combustion chamber may still be too low to induce complete combustion of the injected fuel. The resulting unburned and partially burned fuel is exhausted as a mist of small droplets that is seen as white smoke (cold smoke). This situation normally lasts for less than a minute, but the exhaust is irritating to the eyes, and can be objectionable if a number of vehicles are started together in an enclosed space. A fuel with a higher cetane number can ameliorate the problem by shortening the time during which unburned fuel is emitted to the atmosphere.

Benefits of Using An Espar Heater

Espar Heater Systems

Espar Heaters Reduce Pollution:

A Typical diesel 8-14 liter engine pollutes as much as 150 cars. Diesel engine smoke is caused by incomplete combustion. White smoke is caused by tiny droplets of unburned fuel resulting from engine misfiring at low temperature. This smoke should disappear as the engine warms up.

Espar Heaters Save Time:

Air and Coolant heaters are available with optional timers. Equipment operators can start working immediately without having to wait for the engine and hydraulics to "warm-up".

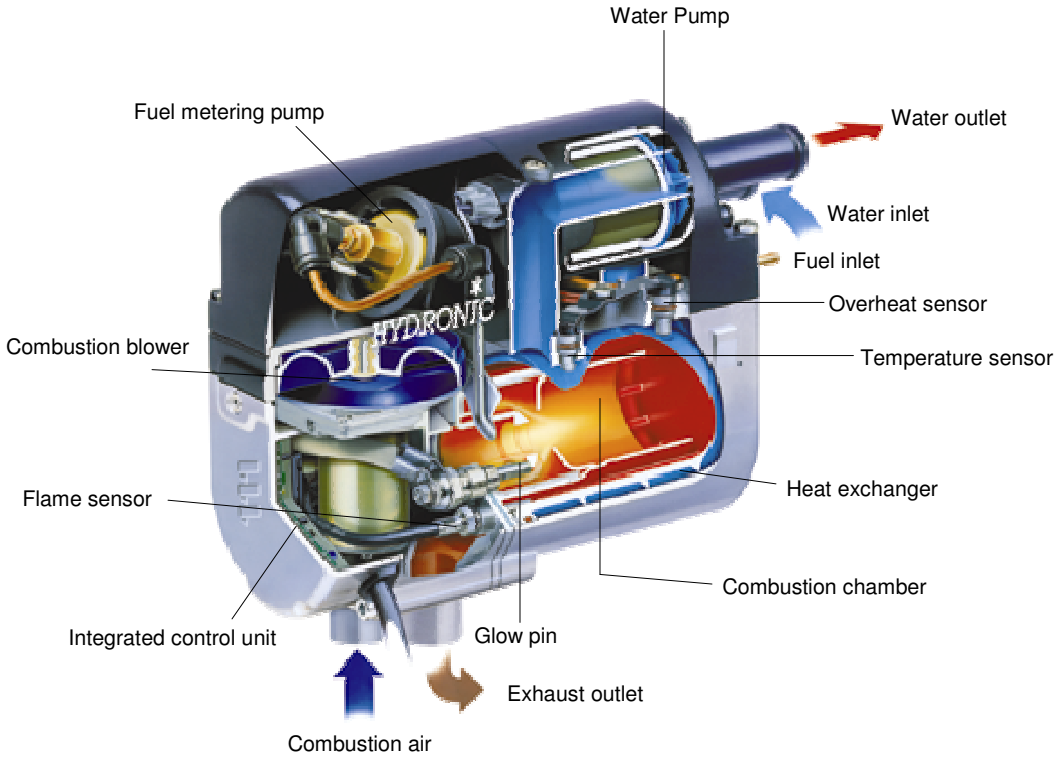
Espar Heaters Extend Component Life:

Batteries - A fully charged battery has only 40 percent of its cranking power at 0°F. Even if the engine is kept at a starting temperature, you could easily drain the battery trying to start the engine in severe cold weather

Espar Heaters Save Fuel:

While Diesel Fuel No. 1 has an advantage in low temperature operability, there are some disadvantages, as well. The energy content of Diesel Fuel No. 1 is about 95% that of Diesel Fuel No. 2 and will provide a correspondingly lower fuel economy and combustibility. Diesel Fuel No. 1 is also lower in viscosity and provides less lubrication for the fuel pump and fuel distributor.

HYDRONIC 5 - Pre-Heater



Specifications: *HYDRONIC 5*

Heat Output BTU/hr (kW)	17,100 (5.0) - High 8,200 (2.4) - Low
Fuel Consumption US.gal/hr (l/hr)	Diesel 1, 2, kerosene 0.16 (0.62) - High 0.08 (0.30) - Low
Electrical (12v) **Consumption**	4.4 amps - High 1.9 amps - Low
Water throughput	234 US gal/hr against 0.1 bar (900 l/hr against 0.1 bar)
Weight	6.4 lbs.. (2.9 kg)

AIRTRONIC D2 - Air Heater

Espar Heater Systems

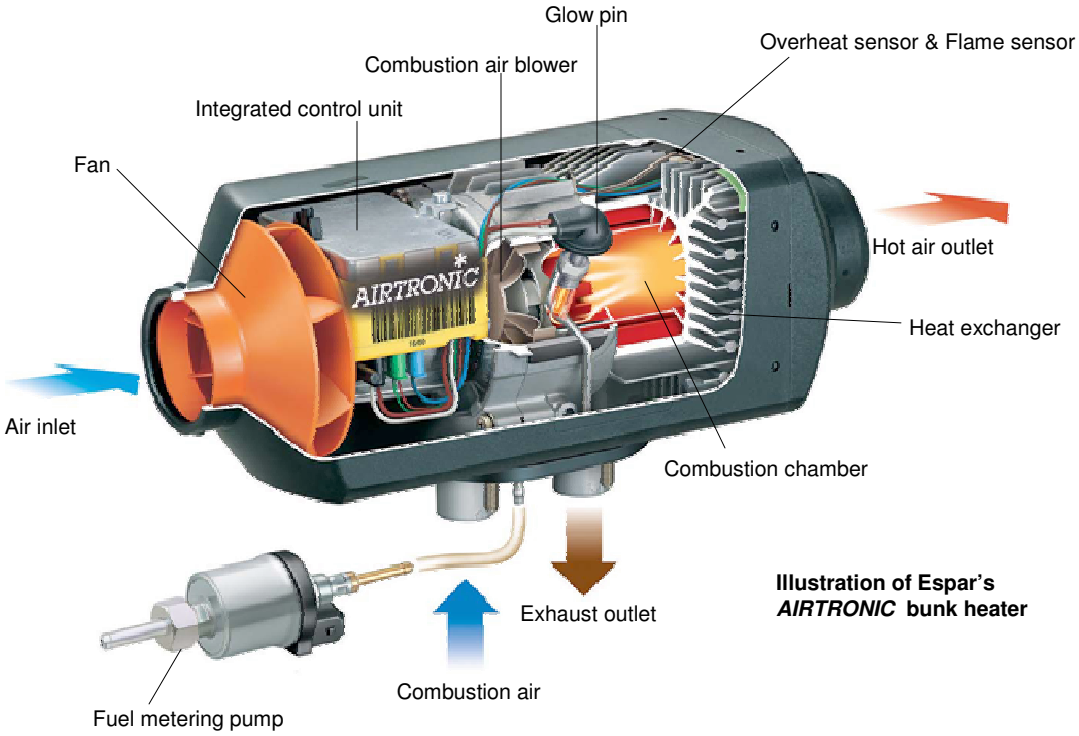


Illustration of Espar's *AIRTRONIC* bunk heater

Specifications: *AIRTRONIC* D2

Heat Output BTU/hr(kW)	7,500 (2.2) Boost 6,150 (1.8) High 4,100 (1.2) Medium 2,900 (0.85) Low
Fuel Consumption gal/hr (L/hr)	Diesel 1,2 o Kerosene 0.074 (0.28) Boost 0.061 (0.23) High 0.037 (0.14) Medium 0.026 (0.10) Low
Electric Consumption 12V model shown 12 or 24V available	On start 8.3 amps 2.8 amps (Boost) 1.9 amps (High) 1.0 amps (Medium) 0.67 amps (Low)
Air Throughput	48 cfm on Boost 40 cfm on High 27 cfm on Medium 19 cfm on Low
Weight	5.9 lbs.. (2.7 kg)

SERVICE TIP: Readily accessible glow pin and screen allows servicing of the installed unit in the least amount of time. Modern design keeps maintenance costs to a minimum and allows servicing of many components without removal of the heater.

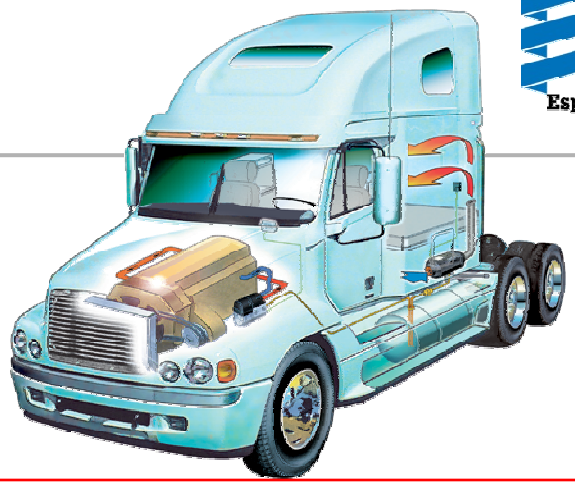
The 13,600 BTU Airtronic D4 is also available in truck kits for units domiciled in extreme weather areas

Uncompromised Quality

Espar Heater Systems

Espar provides uncompromised quality
at competitive pricing

- Built with high-grade materials engineered for **durability** and **reliability**
- Supported by professional regional sales managers, trainers, engineers, and nationwide dealer network
- Espar offers a technical '**help line' for customer support at no charge to the customer—no matter the age of the equipment and whether in or out of warranty**



Idle Reduction

Options

- **Warm the engine and coolant system**
- **Warm the cab or sleeper**
- **Warm the fuel**

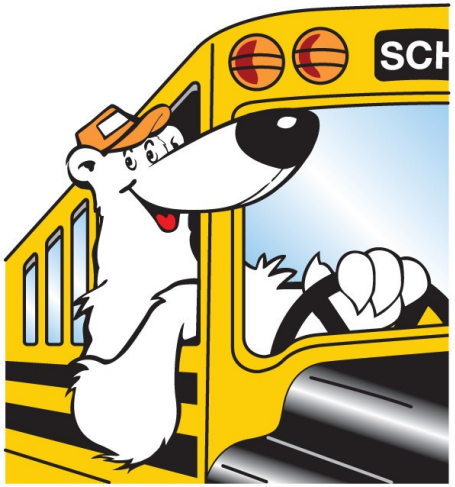
- **WITHOUT idling the main diesel engine**
- **WITHOUT wasting one gallon of fuel per hour**
- **WITHOUT spewing tons of pollutants into the atmosphere**

• **ESPAR earned EPA validation** for Class 8 truck applications for air heaters and coolant heaters— and **CARB approval** *California Air Resources Board*

Why buy a fuel-operated heater on a school bus?

Espar Heater Systems

There are three reasons to buy a fuel-operated heater for a school bus.



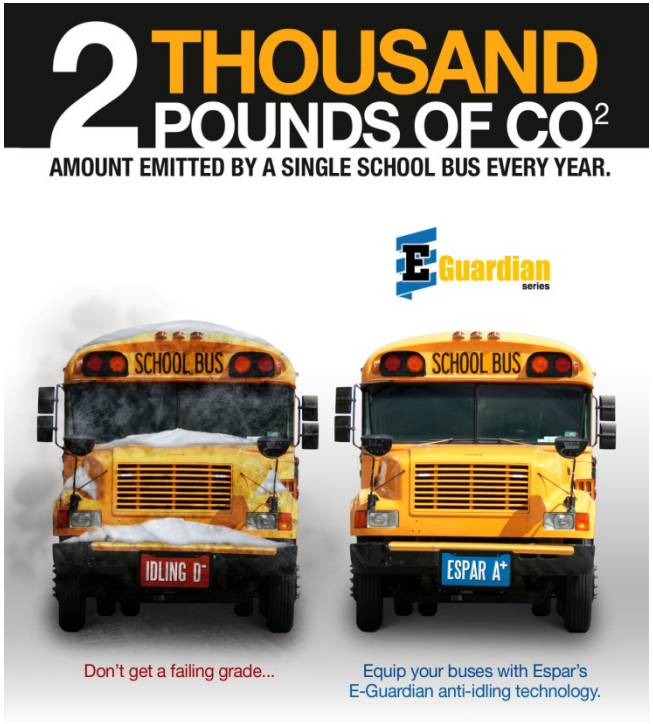
- **TO IMPROVE SAFETY**
- **TO SAVE MONEY**
- **TO REDUCE POLLUTION**

Reduces Pollution

Espar Heater Systems

How does a fuel-operated heater reduce pollution?

- Provides a warm engine start-up, reducing emissions associated with starting a cold diesel engine
- Reduces air pollution caused by school bus idling for heat and defrost
- Helps drivers observe local & state idle reduction laws
- Helps reduce noise pollution caused by a fleet of idling school buses

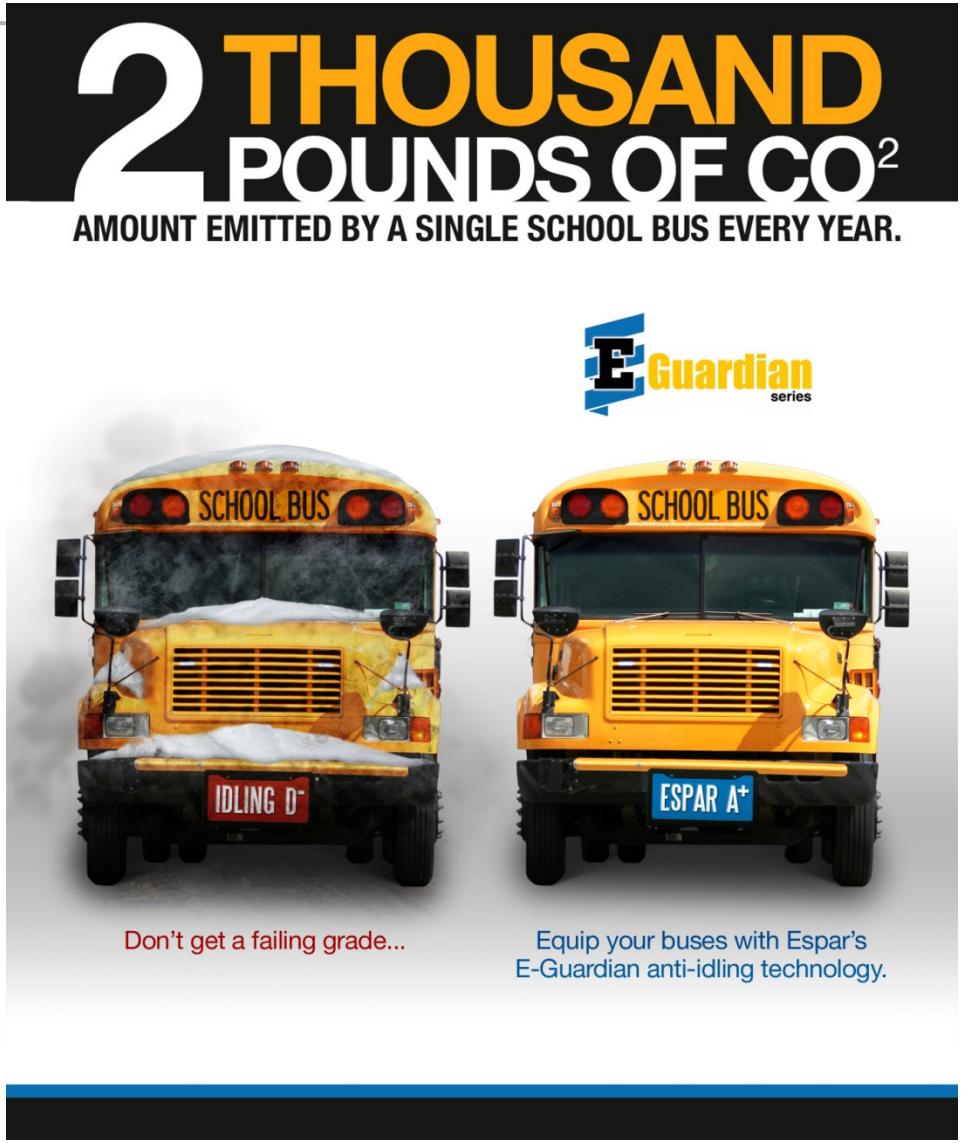


E Guardian series

School bus

Espar Heater Systems

- **Provides a warm engine start-up, reducing emissions associated with starting a cold diesel engine**
- **Reduces idling & bus emissions resulting in cleaner air for the children to breathe.** (Diesel exhaust is a likely human carcinogen and can contribute to other chronic health effects -- ***EPA's Health Assessment Document for Diesel Exhaust)***
- **Helps drivers observe idle reduction laws**
- **ESPAR earned EPA validation for school bus applications for air heaters and coolant heaters— and CARB approval**



E-GUARDIAN series Heaters From Espar!

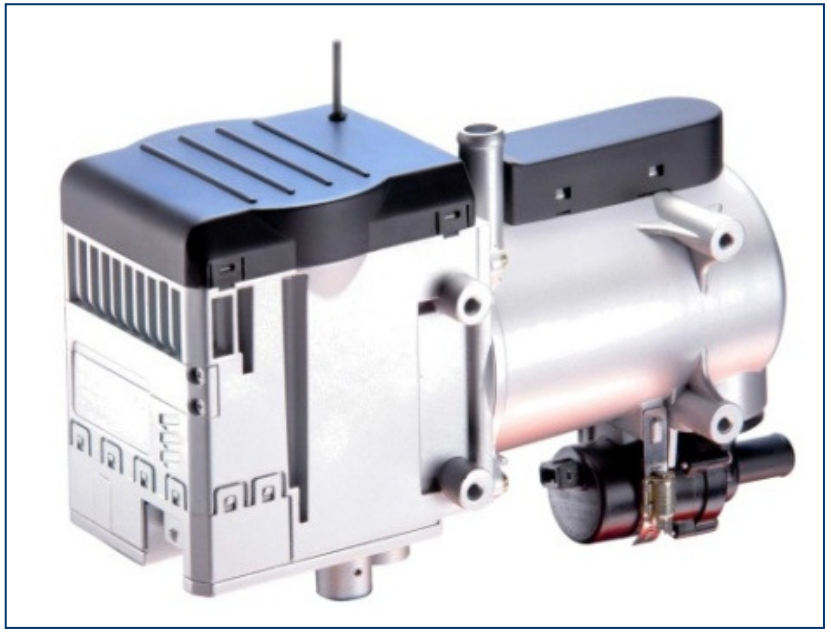
Espar Heater Systems

For School Bus Applications

Factory Installations

Espar Heater Systems

E Guardian series



E-Guardian 5

E-Guardian 8, 10, & 12

Saves Money

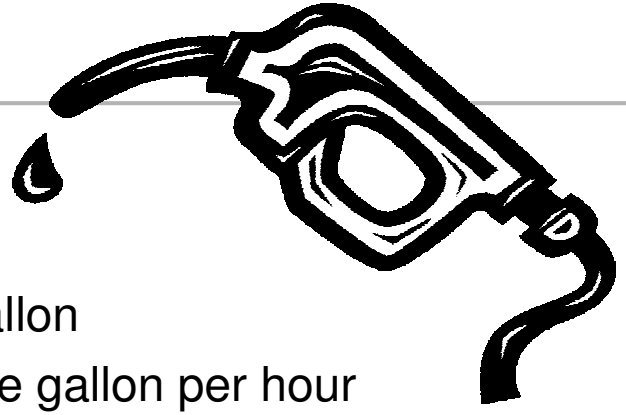
Espar Heater Systems

How does a fuel-operated heater **save money** in school bus operations?

- Reduces money spent on fuel wasted by idling buses
- Reduces driver on-board time with pre-heated engines
- Extends engine life and engine warranty by reducing operating hours on the engine
- Reduces engine maintenance costs

Idle Reduction Saves Dollars

Espar Heater Systems



Assumptions:

- Diesel fuel costs $4 per gallon
- Idling consumes nearly one gallon per hour
- Idling for 2 hours per day for heat and defrost
- Cost $8 per day to idle the bus
- 100 average cold school days per year
- **$800 cost of fuel used to idle one bus per school year**
- Average life of a school bus is 12+ years
- **Adding an Espar heater will save many thousands of dollars beyond the additional cost of the equipment to the customer**

THE FIGURES MAY CHANGE

But the message remains the same

IDLE REDUCTION SAVES BIG DOLLARS

E-Guardian Warranty

“We love our Espar heaters”

quote from a happy Espar school bus customer!

E-GUARDIAN series Heaters From Espar!

Espar Heater Systems

E-Guardian heaters —

- Provide engine pre-heat & supplemental heat for warmer interiors and reduced idling time
- Start without driver effort
- Save customer's money
- Are simple to operate
- Improve safety on the bus
- Are the best heaters on the market! ☺

Espar is here to support YOU and YOUR CUSTOMERS

1-800-387-4800

Stop Idling, Think Safety, Go with Espar

Everything needed for installation
Boxed for protection
Includes programable timer
Inertia switch for safety
Bio-Diesel friendly

Carb Approved / EPA verified
Driver & Passenger Comfort
Automatic Altitude Adjustment

They're simple
Engine pre-heaters operate as hot water furnaces utilizing the buses own diesel fuel and batteries to produce heat.

Effective!
The heater's water pump circulates engine coolant to transfer heat to the engine and heat exchangers.

Productive
Timer controls can switch heaters on 1-2 hours prior to engine start up, to allow operators to go directly to work.

Economical
Available as basic kits or value priced complete boxed kits available.

E-GUARDIAN 5

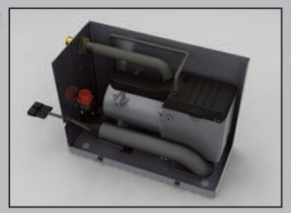
Boxed E5, 12V
P/N: 25.2823.25.0500
Basic E5, 12V
P/N: 25.2823.25.0506

* Basic Kits include heater, Installation kit and crash sensor.

E-GUARDIAN 8,10,12

Boxed E12, 12V
P/N: 25.2824.72.1200
Basic E12, 12V
P/N: 25.2824.72.1201

* Boxed Kits include Heater, full comprehensive installation kit, crash sensor, protective enclosure, mounting tray and digital programmable timer.



Which E-GUARDIAN is right for you?
5, for engine pre -heating, instant defrost, provides driver stand by heat!
12, provides all of above plus supplemental heat to the entire passenger cabin!

Digital Programable Timer
P/N 5670433

- Allows for continual repetition of the selected event cycle.
- Compact for a variety of location mounts
- Set and Forget

E-GUARDIAN specifications

	5	8 (PME)	10	12
	12/24V	12/24V	12/24V	12/24V
Heating Output - BTu/hr	8,200-17,000	5,120-27,300	5,120-32,450	4,100-42,000
Electrical Consumption - amp	1.9-4.2/.95-2.1	2.64-4.6/1.3-2.3	2.6-6.2/1.3-3.1	2.4-8.4/1.2-4.2
Fuel consumption - gal/h	008 - 0.16	0.05 - 0.24	0.05 - 0.32	0.04 - 0.40
Weight - lbs	39	70	70	70
Dimension - inches (l x w x h)	8.6 x 3.5 x 6.2	13 x 5.4 x 8.6	13 x 5.4 x 8.6	13 x 5.4 x 8.6

Tested and Validated

Espar Heater Systems

- ESPAR earned EPA validation for school bus applications for air heaters and coolant heaters— for a variety of school bus needs
- ESPAR is listed on the EPA website as an idle reduction solution for school buses
- ESPAR earned CARB approval
  California Air Resources Board--industry standard for low emissions ULEVII

Heaters and Solutions for a Wide Variety of Applications

Espar Heater Systems

Espar Heater Systems

eco

ANTI-IDLING, EMISSION REDUCING EQUIPMENT

Major Supplier in the Global Marketplace

SCR Technology & Exhaust Systems

Greenhouse Gas Quantification

Developed for the Alberta Offset System and the Voluntary Carbon Standard
BLUE SOURCE CANADA ULC & ESPAR